Flowing Together or Flowing Apart: An Analysis of the Relation between FDI and ODA Flows to Argentina and Brazil

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September 2010

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Version: september 2010

Abstract

The analysis of the relationship between ODA and capital flows is scarce and has provided cross-country ambiguous results. The purpose of our study is to explore the relation between FDI and ODA for Argentina and Brazil. We have divided the analysis into the macro and the micro approach. From the macro perspective, we analyze the volatility and cyclical aspects of both flows. We also study if they buffer GDP's shocks. We find that aid is more stable than FDI… At micro level, we look for structural relations by analyzing sectorial destination of both flows. We find that the main foreign direct investors are also the main donors but no systematic relation emerge between FDI and ODA flows, except for the Japanese case in Brazil.

JEL: F21, F35,

Keywords: Foreign Direct Investment, Official Development Assistance, International Capital Flows, Emerging Economies Financing.

1. INTRODUCTION

The analysis of the relationship between official development assistance (ODA henceforth) and private capital flows is still scarce and has so far provided ambiguous results, as we will describe in our literature review. The fact that several international organizations such as the OECD and the UNCTAD have called for the adoption of measures that allow to take advantage of the potential interaction between ODA and foreign direct investment (OECD, several years and UNCTAD, 2008) point to some relation between these two flows.

From the political economy approach, the existence of a relationship between both types of flows would indicate some sort of coordinated interaction/feedback between the private and the public sector in the donor/host economies. In fact, there is an increasing number of international political economy analysis and economics surveys that suggest that foreign aid does not precisely flow where it is most needed but where is needed and politically convenient for the donor government (Alesina & Dollar 2000; Berthelemy 2006; Fenny & McGillivray 2008; Hoeffler & Outram 2008). On the other hand, according to Dunning and Lundan (2008), there is recent and increasing evidence of the action of home governments supporting foreign direct investment (FDI henceforth) outflows to advance economic, political and strategic interests. In this sense, if both flows are complements, it would be important to analyze whether ODA *opens the door* to private capital flows or private capital flows *call* for ODA to solve possible host country deficiencies such as lack of proper infrastructure.

However, if ODA and private capital flows, especially foreign direct investment (FDI henceforth), are substitutes, the aforementioned interaction between private and public sector could somehow be coordinated so as to efficiently allocate ODA when and where is more necessary in line with the aforementioned proposals of the OECD and the UNCTAD.

Given the crucial macroeconomic role played by the stability of capital flows, the confirmation of any sort of relation between both ODA and FDI flows would call for a more in-depth analysis of the volatility of both flows and their ability to constitute a buffer against the so-called boom and bust cycles. Statements such as the Paris Declaration (OECD 2005) and the Accra Agenda for Action (OECD 2008) have called for ODA's stability and predictability.

A more in depth macroeconomic analysis would reveal that the relationship between ODA and FDI flows is relatively complex. On the one hand, it is commonly accepted that FDI, especially market-seeking FDI is attracted by the host economy size in terms of its GDP and its ability to grow. In this sense, if ODA flows contribute to economic growth in the recipient country, this could spur FDI. On the other hand, in the long run, ODA could add to domestic savings therefore propelling domestic investment. The impact of such raise in domestic investment on FDI would depend on the absorption capacity of the host economy as well as on the ability of FDI to complement or substitute for domestic investment and ODA flows. Given the long-run aspects of the aforementioned relations, both effects are out of the scope of our study.

The goal of this article is to analyze the relationship between ODA and foreign direct investment[1] for the specific cases of Argentina and Brazil, specially between 1992 and 2002. The selection of two countries classified as middle-income economies responds to the sharp changes experienced by the composition of international capital, both public and private, flowing to emerging and developing countries between the mid-seventies and the first years of the new century.[2]

Both countries received large amounts of private capital flows during the 1990s. Moreover, both suffered deep financial crises; Brazil in 1999 and Argentina in 2001-2002 that have, to a certain extent, been associated with the opening of their capital accounts. Finally, Argentina and Brazil implemented neoliberal reforms during the 1990s that shared some common features: use of the exchange rate as a stabilization tool, privatization programs, relative opening of the current and

financial accounts, and deregulation. While these reforms attracted large amounts of private capital flows to both countries, they did not prevent the aforementioned financial crisis. In this sense, the fact that both countries are classified as middle-income becomes even more poignant, especially when several aid agencies from developed countries, such as the United Kingdom, the Netherlands and Canada, publicly announced during the 1990s that they would discontinue operations in middle income countries, so they could concentrate their efforts in less developed countries (SELA, 2005). ADD REFERENCE

We are particularly interested on the relationship between ODA and foreign direct investment. Facing decreasing ODA levels since the early 1990s, developing and leasts developed countries will have to rely on private capital flows (remittances, bonds, equity, FDI or private aid) in order to finance their potential external disequilibria. In this sense, FDI is supposed to be less volatile than portfolio investments, but compared to ODA it is not so clear. This is especially important in the specific case of Midlle Income Countries that tend to experience volatile cycles of capital inflows and outflows. Secondly, we are also interested in this relationship given the long-term features inherent to FDI and ODA results in income per capita terms. Thirdly, while FDI is recorded as a financial flow, the flows are associated with multinational production that could generate positive externalities on the host economy. ODA, specially if the resources are channeled to economic infrastructure, might have the same impact. Finally, FDI and ODA have been seen as substitute flows, and some policy-makers might think that ODA should not go to Middle Income Countries precisely because they get financial resources in capital markets. So, what is the empirical evidence between these flows is a high relevant issue with remarkable implications in political economy.

We start our analysis by describing the scant literature on the topic. We then briefly provide a descriptive analysis of the evolution of both private and official flows. This section includes a general overview of the flows as well as a more detailed analysis of the evolution of FDI and ODA flows to Argentina and Brazil. The fourth and main section focuses on a statistical

analysis of the relationship between both sets of flows. We analyze ODA and FDI by donors and sectors, and amounts to economic infrastructure more in depth. We also include in this section an exercise that seeks to determine the ability of ODA flows to "compensate" for FDI reversals. We conclude the paper summarizing our main findings.

2. LITERATURE REVIEW

The abrupt change in the composition, magnitude and directions of capital flows experienced between the early 1970s and the early 1980s and then again since the late 1980s has renewed the interest on the determinants, effects and relationships among the different types of flows.

According to the literature surveyed, the first analysis is Papanek's in 1973 inside the search of empirical evidence of the Chenery & Strout's 1966 two-gaps model. While the purpose of his article is to look for the relation between savings, foreign capital flows and economic growth, the author analyzes the correlation between aid and foreign private investment. Papanek's results seem to indicate that there is no statistical relation between official aid and private flows.

Most of the literature surveyed agrees on the fact that ODA, and especially multilateral ODA, does not have a significant effect on FDI (Papanek, 1973; Rodrik, 1995; Tuman and Emmer, 1999, and Kosack and Tobin: 2006) unless it flows to inputs that are FDI-complementary (Kapfer *et al*, 2007; Kimura, 2007 and Selaya and Sunesen, 2008) and/or the recipient enjoys a certain degree of financial market development and good governance (Karakaplan *et al*, 2005). Partially challenging these results, Harms and Lutz (2006) suggest that the effect of official aid on private foreign investment (FDI plus portfolio equity flows) is negligible unless the recipient bears a high regulatory burden. Furthermore, Asiedu and Villamil (2002) argue that foreign aid reduces default risk thereby promoting foreign private capital. While their analysis does not specifically target FDI, it does suggest that ODA would have a positive effect on FDI in those countries where enforcement is inadequate. Finally, Ali and Isse (2006), in analyzing the determinants of foreign aid, find that FDI has a negative and significant relation to ODA. The argument used is that FDI encourages certain types of institutions and incentives that are not compatible with "overly managed" ODA.

We suggest that the above results might be related to the nature of the empirical analyses. To be sure, most of the studies use aggregated data that agglutinates countries at different development stages and do not consider pairs of donors/home-recipients/host.

A quick glance at the surveys that focus on bilateral aid and work with pairs reveals different results. Using a data set of donor-recipient pairs, Kimura and Todo (2007) identify three effects of ODA on FDI flows; a positive infrastructure effect, a negative rent-seeking effect and a positive "vanguard" effect. The latter refers to the positive impact that aid flowing from a specific donor to a particular recipient has on FDI flows from the donor (home-country) to the recipient (host-country).

Regarding bilateral aid, Yasin (2005) finds, for 11 African countries, that bilateral ODA does exert a positive influence on the attraction of FDI flows. By the same token, Blaise (2005) finds that Japanese ODA to China attracts FDI flows. Following Dunning's OLI framework, Blaise sustains that bilateral ODA affects location choices.

To sum up, the literature review seems to indicate that there are three distinct possibilities regarding the impact of ODA on FDI; (i) a positive effect that is more significant in bilateral ODA allocated to infrastructures and that could be intentional (vanguard effect suggested by Kimura and Todo (2007), (ii) a negative substitution effect created by the crowding out of private investment (specially by tied aid flows), and (iii) a neutral effect that suggests that ODA flows do not have any impact or strategic influence on private foreign investment.

3. EVOLUTION OF CAPITAL FLOWS: SOME STYLIZED FACTS

The goal of this section is to show the main features of capital flows to Middle Income Countries, and describe the stylized facts of the FDO and ODA flows to Argentina and Brazil. We have used databases from World Bank (WDI), UNCTAD and OCED to get GDP, FDI and ODA flows in current dollars. To take into account hyperinflation periods and to smooth the time series, we have transformed them in constant 2000 dollars. We have got the deflactor comparing the GDP in current and constant dollars offered by WDI (2008) version.

3.1 General Evolution of Capital Flows to Middle-Income Countries

Most middle-income countries, and specially Asian and Latin American countries, have participated in the so-called process of global financial integration that ensued in the 1990s. However, the composition and distribution of capital flows to middle-income economies have experienced sharp changes in the last three decades.

As shown in Chart I, since the mid-1970s and until the 1982 debt crisis, middle-income economies were the recipients of a large pouring of commercial bank loans. After 1982, the outburst of defaults resulted in a sharp and rapid withdrawal of bank lending that left middle-income economies with scarce access to international capital markets. Facing severe external financing restrictions, many developing countries adopted structural adjustment plans that culminated in 1989 with the implementation of the Brady Plan. During the adjustment period, ODA flows increased but did not reach the values displayed before the 1970s (Akyüz and Cornford, 1999).

[Insert Chart I here]

The 1990s opened the door to a new surge in capital flows led by private flows, and especially

FDI. Chart I shows the vast increase in FDI flows to middle-income countries after 1992. Particularly fast growth took place between 1985 and 1990 and between 1995 and 2000.[3] The growth experienced during the period 1995-2000 is even more poignant when we take into account the several crises that plagued some emerging economies during those years (Mexican peso, East Asian, Russian, Brazilian and Argentinean crises).

In 1970, FDI flows to developing countries accounted for 29% of total flows. This percentage increased to 40.3% by 1994. The contribution of FDI to the domestic economies is also very significant. In this sense, between 1970 and 1994, the stock of FDI in developing economies doubles its contribution to GDP.[4]

Despite this substantial expansion in FDI activity, foreign investment is still dominated by the highly developed countries from both the stock and the flow perspectives. However, FDI has been, since the late 1980s, the largest component of net resources flowing to developing countries and these economies play a significant role as recipients. Moreover, as displayed in Chart II, they follow a trend that is similar to that exhibited by developed countries.

[Insert Chart II here]

3.2. Capital Flows to Latin America

We now turn to the analysis of Latin America as a recipient of capital flows. The Latin American region has been relatively well integrated into the world economy since the beginning of the XXth century. The composition of capital flows to Latin American countries has experienced significant changes since 1970. Following the trends described for middle-income economies, there has been a shift in favor of private flows vis-à-vis official flows.

As shown in Chart III, commercial bank lending played a key role as an external financing source from 1973 to 1982. In 1981, bank loans accounted for almost 3.8% of the Latin

American GDP. After the explosion of the debt crisis in 1982, this percentage severely decreased to rates around 1%. As we have generally described for the middle-income economies, the defaults of the early 1980s not only propelled the departure of commercial bank lending, but they also isolated the region from the international capital markets. In this sense, total external financing of Latin America, including ODA flows, averages 1.7% of GDP between 1983 and 1990, when the first results of the Brady Plan materialized. During this period of severe financing restrictions, ODA flows increase in relative terms but do not fill-in the gap left by the loan withdrawal.

[Insert Chart III here]

The 1990s witnessed an exponential increase in the amount of FDI flowing to the region. This raise is especially important between 1994 and 2000 when many countries in the region implemented ambitious privatization programs opened to the participation of foreign firms. The relative importance of Latin America as a recipient of FDI vis-à-vis the rest of the world fluctuates between 5% and 6% of total world FDI stocks between the beginning of the 1980s to 2007, displaying peaks above 8% as a result of the accumulated effects of privatization. The enactment of these privatization programs was accompanied by the adoption of vast structural reforms and stabilization programs that improved the macroeconomic fundamentals. These factors, together with favorable conditions at the international level, help explain the evolution of FDI and that of equity portfolio flows. Meanwhile, ODA flows continue to increase during this last period at a very slow pace, negatively affected by the so-called "aid fatigue".

3.3 FDI and ODA flows to Argentina and Brazil

FDI flows

Given the relative large size of their markets, both Argentina and Brazil have played a significant role as FDI recipients within the Latin American context. During the 1970s, these two countries were immersed in the last stages of the import substitution industrialization strategy that "protected" their markets against imports but enabled transnational corporations to invest, especially in the industrial sector. As Chart IV displays, between 1972 and 1983 the two Southern Cone countries were the main recipients of FDI flows in Latin America. Together they attracted almost 90% of all the flows to the area in 1972. The debt crisis and the painful structural adjustment period that followed, resulted in a decline of FDI flows to the countries thereby reducing their participation in total FDI flows to Latin America to an average of 36.7% between 1982 and 1990. As in the rest of the Latin American region, the 1990s brought a tide of changes that attracted fresh flows of FDI to both countries although their relative participation in the Latin American total has decreased. It is also important to note that as a percentage of the world's FDI flows, both countries have lost weight as a host-region.

An analysis of the pattern followed by FDI inflows to both countries reveals similar trends for the period 1970 to 2006. However, a closer look at the series in constant dollars (the series have been deflated using the WDI 2009 data and calculating a GDP deflator with 2000 as the base year) illustrates several differences worth highlighting. After the debt crisis, Brazil recovers FDI inflows before Argentina. However, the former embraces the neoliberal structural reforms programs and privatizations before Brazil, thereby attracting large amounts of FDI in the 1990s before Brazil does. As a matter of fact, flows to Brazil are higher for most of the period under consideration with the exception of the years 1991 to 1996.

In the height of the privatization process, between 1997 and 2001, FDI flows reached their maximum levels, 32,779 million dollars in Brazil in 2000 and 24,236 million dollars in Argentina in 1999. Both countries are severely affected by the 2001 crisis but the post-crisis context is different; Brazil recovers earlier than Argentina and attracts a larger amount of FDI

inflows. Moreover, the giant of the Southern Cone is now considered one of the top ten destinations for foreign investment in the near future (UNCTAD, 2009).

A sectoral analysis reveals a relative concentration of FDI in a few sectors in both countries. In Argentina, oil and the tertiary sector (especially the financial sector) have received a large percentage of the total flows between 1992 and 2002, according to data from the Bureau of International Accounts of the Ministry of Economy. It is important to point out that flows to the oil sector are dominated by REPSOL's acquisition of YPF in 1999. The sectoral data provided by the UNCTAD FDI statistics website does not enable us to carry out a complete comparison since it is stock data. However, the analysis of such data indicates that a large percentage of the FDI flows allocated to Brazil poured into the tertiary sector (especially the financial and trade sectors). The role played in both countries by the services sector as a main FDI attractor is not surprising when we take into account the privatization processes that Argentina and Brazil undertook during the 1990s. Moreover, such pattern was also experienced by other developing nations during that period of time.

A large percentage of the FDI flows that entered Argentina and Brazil materialized in Mergers & Acquisitions. The average for the period 1990 to 2003 on both values indicates that around 60% of FDI was conducted through M&A (UNCTAD's Online Database). This large prominence of M&A as a source of FDI suggests that at least some of the FDI placed in the region corresponds to the market-seeking type.

Finally, regarding the main investors, there is a significant geographical change in the home countries that allocate their FDI flows to both Argentina and Brazil. In both cases, several European countries have relatively displaced the United States as the traditional main home-country. More specifically, in Argentina during the period 1992 to 2002 the main investor is Spain, followed by the United States and Italy. In Brazil, the major investors between 1990 and 2002 are the United States followed by Spain and the Netherlands.[5]

ODA flows.

We now turn our attention towards ODA flows. As we have already mentioned, both Argentina and Brazil are middle-income countries.[6] In this sense, ODA flows do not play a significant role neither as a percentage of their output – it reaches a maximum value of 0.45% in Brazil in 1970 and 0.3% in Argentina in 1989[7] – nor as a percentage of their gross capital formation –a maximum value for Argentina of 1.77% in 1989 and 2.16% in Brazil in 1970.

In per capita terms, both countries receive less ODA flows than the average of the Latin American region ($4.09 for 1985-2005). Argentina has received $3.87 whereas Upper Middle Income Countries have received $4.05 per capita. Brazil's flows ($3.99) are, however, just above the average of countries in its income bracket (lower middle income that received $3.93). On an average annual basis, Argentina has received lower net ODA flows than Brazil. The exception is the period between 1989 and 1993 when the flows allocated to Argentina were higher (Chart V).

[Insert Chart V here]

Adding up all the flows, in constant 2000 dollars, received between 1970 and 2006, Argentina amounts to $ 5,492 million, (97% of them bilateral), while Brazil receives $ 10,100 million, also displaying a vast majority of bilateral flows (99%). The behaviour of flows is different in both countries. At the beginning of the period, ODA flows to Brazil are substantially higher but exhibit a decreasing trend. Meanwhile, flows to Argentina show a relative stable trend until 1986 when they start to rapidly increase until the early 1990s. The aforementioned "aid fatigue" of the 1990s together with the fast period of economic growth experienced by both countries probably explains the decline in aid flows in this decade. [8] This decline is more significant in Argentina. The severe impact of the 2001 crisis attracts aid to both countries as evident in the

increase in flows. However, while ODA has remained relatively stable in Argentina, it already shows signs of decline in its neighbour.

Considering the ODA flows in gross disbursements terms (not taking into account the returns as net flows do) for 1984-2006, allow us to identify some interesting enough differences.

[Insert Chart VI here]

The main "peaks" in the Brazilian time series are due to the variations of the United States flows. The US allocations in Brazil are extremely overriding in 1992 (90% of the total) and 1992 (85%) and 2001 (60%). Besides the US (1.659 million dollars), Japan (1,534 millions) and Germany (961 millions) are the main donors in Brazil. Germany, the Netherlands and France have given much more ODA to Brazil than Argentina. On the contrary, Italy (740 millions), Spain (283 millions) and the United States (276 millions) are the main donors in Argentina. In the specific case of Spain, it is important to mention the use of the so-called FAD loans (Development Aid Fund). These loans, tied to Spanish procurement, are guaranteed by the public sector through CESCE (an export credit public company). The use of FAD loans in Argentina (Spain has never given FAD loans to Brazil) might be considered as "unfair competition" vis-à-vis private investment. However, FDI cannot be supported by FAD coverage.

The analysis of the most important donors reveals that ODA is a bit less concentrated by donors in Argentina (an average Herfindahl index of 0,498) than in Brazil (whose Herfindahl index is 0,518).

From the sectoral point of view, official aid mainly flows to social infrastructure and services (25% in Argentina and 26% in Brazil). In Argentina, this is followed by productive projects (22% of the flows) and economic infrastructure (18%) while in Brazil is followed by aid to multi-sector projects (17%) and productive projects (11%). Table I displays information on ODA bilateral flows (rows 2 and 3) by sector, identifies the main donor in each sector (row 4) and details the amount of that donor in each sector in volume (row 5) and percentage terms (row 6).

[Insert Table I here]

4. ANALYSIS OF THE EMPIRICAL RELATION BETWEEN FDI AND ODA FLOWS

In this section we describe the main findings of the analysis of FDI and ODA data for the specific cases of Argentina and Brazil, using data in real terms (2000 as the base year as we explained in the beginning of section 3) for 1970-2006. For sensitivity purposes we smoothed time series using Hodrick-Prescott's filter method (lambda equals 100) and compare the results obtained in constant terms with the filtered series.

To begin with, we measure the impact on the GDP's cycle through the correlations among external flows and GDP. Considering time series without filter, FDI and net ODA are rather pro-cyclical (the correlations coefficient using filtered series are 0.96 and 0,34 respectively) in Argentina. The effect is clearer in gross ODA (0,51) than in net ODA. On the contrary, ODA in Brazil is counter-cyclical (-0.84 in net terms and -0.68 in gross) whereas FDI is pro-cyclical (the correlation coefficient to GDP is 0.81).

Besides this first analysis, we have focused on three crucial aspects: (1) correlation analysis between FDI and ODA in general terms, and taking into account investors and donors for each of the countries; (2) volatility of the time series for both FDI and ODA; and (3) relationship between flow shocks.

4.1. Investors-Donors Correlation Matrix

Most of the literature surveyed for our study finds that the vast majority of the different types of capital flows are either negatively correlated or uncorrelated at all. However, most of these studies focus on the correlation between different types of private capital flows. Using our time series for all donors/investors (1970-2006) we have found that FDI and ODA are positive correlated in Argentina (the correlation coefficient is 0.31 considering net ODA and 0.55 gross ODA). This fact suggests a possible complementary relationship between both variables. In the

Brazilian case, a negative correlation has been found between FDI and ODA (-0.84 with net ODA and -0.31 with gross ODA). This negative sign implies an hypothetical substitution effect. To confirm these different relationships in the Argentineans and Brazilian cases we went further and focus on bilateral pairs. This time, the UNCTAD online database has restricted our analysis to the period 1992-2002 because FDI data by investor is only available for this period. For the ODA data, we have used the OECD-DAC, Creditor Reporting System (CRS) database and compared FDI stocks to overall and economic infrastructure ODA stocks. This database allows us to carry out several correlations analysis between FDI and ODA flows by investors/donors and recipients pairs and by ODA sectors.

[Insert Table II here]

Argentina

The main results for Argentina are displayed in Table II. The data analysis showed that the main foreign direct investors, measured by the accumulated FDI flows between 1992 and 2002 in constant USD 2000, are Spain (36.2% of the total), the United States (21.8% of the total) and Italy (3.7% of total FDI stock). Regarding ODA flows, the main donors, measured by the accumulated ODA flows between 1992 and 2002, have been Italy (44.6% of the total), followed by the United States (22.2%) and Spain (15.6%).

While a preliminary analysis suggests that there is a coincidence between investors and donors, this does not necessarily imply that there is a cause-effect relationship between FDI and ODA. A simple correlation analysis between both flows reveals that for the *United States*, that provides near 22% of FDI and roughly the same percentage of ODA to Argentina, the correlation coefficient is 0.28 and a R^2 of just 0.082. Despite the fact that the positive sign could suggest that the ODA was intentionally allocated to Argentina to open the door to FDI, we should reject this hypothesis since the United States official aid has not flown to economic infrastructure.

In the case of *Spain*, the main foreign investor and the third donor, the correlation coefficient is -0.53 and the R^2 is 0.280. Even though the negative sign could be interpreted as a negative relation by which the lower the FDI the higher the ODA that flows to Argentina, the determination coefficient is significantly low. Therefore, we cannot conclude that the Spanish ODA and FDI flows allocated to Argentina are substitutes. As we have already mentioned, Spain has developed a specific instrument, the FAD loans, that has an export/investment promotion character. This ODA-tied instrument was intensively used during the 1980s and 1990s but its application to Argentina has been scarce and volatile.

Italy is the main donor in Argentina with 44% of the accumulated aid flows. Moreover, the Italian ODA has accounted for 98.5% of economic infrastructure official aid. For the period under analysis, Italy has been the home of just 4% of the accumulated FDI flows. The correlation analysis between FDI and ODA flows results in very low, and negative, coefficients both for total ODA (-0.25) and economic infrastructure aid (-0.39). The R^2 are 0.061 and 0.157 respectively.

Brazil

We also find a relative coincidence between investors and donors in Brazil, although lower than the Argentinean one (See Table II). To be sure, the main foreign direct investors are the United States, Spain and the Netherlands with 20.8%, 14.5% and 7.8% respectively of the accumulated FDI flows between 1990 and 2002.[9] The fourth main foreign direct investor in Brazil is France that accounts for 7.2 of the accumulated FDI flows for the period. However, as a donor, France represents just 5% of the total accumulated ODA flows.

The principal donors are the United States, Japan and Germany that account for 44.8%, 33.5% and 8.8% respectively. Interestingly enough, despite the fact that the *United States* is the

principal donor and investor, the official US aid is not allocated to economic infrastructure. This fact weakens even further the argument that there is some sort of coordination between official aid and private investment. The correlation analysis between FDI and ODA flows for the *United States* delivers results that both flows are not associated (a correlation coefficient of -0.1 and R^2 of 0.009). For Spain, the OECD database only offers data for 1999-2002. These few observations offers a high negative correlation (-0.92 and R^2 0.851). The correlation analysis for both *Germany* and *Japan* shows higher and positive coefficients, 0.78 and 0.71 respectively. The R^2 are also higher; 0.615 and 0.499. These results suggest that FDI and ODA flows from Germany and Japan allocated to Brazil might have moved together.

However, the correlation turns negative once we take into account the ODA allocated to infrastructure. While the correlation is very low for the German case (-0,14 and R^2 0.020), we do find interesting results for Japan. To be sure, the Japanese correlation coefficient is negative and relatively high (-0.75 and a R^2 equal to 0.5591). Our analysis shows that Japan accounts for 33.5% of the ODA flows allocated to Brazil but this percentage increases to almost 46% when we restrict the analysis to the infrastructure sector. These results are interesting if we take into account that the Japanese ODA to Brazil presents a decreasing trend while the FDI flows have been increasing steadily, especially after 1994. In this sense, we do find evidence that supports the existence of the "vanguard effect" suggested by Kimura and Todo (2007). Moreover, the fact that foreign aid exhibits a decreasing trend while Japanese FDI allocated to Brazil increases, could also suggest that foreign aid flows have opened the door to FDI flows.

4.2. Volatility Analysis

The analysis of the volatility of capital flows has received a great deal of attention from academics and international financial institutions. The volatility of capital flows, especially of those targeting emerging and developing economies, has been frequently linked to vulnerability to financial crises (Calvo et al, 1994; Reinhart and Reinhart in Kahler, ed. 1998, etc.).

Moreover, a high volatility of capital flows in economies that have recently liberalized their financial account and largely depend on foreign sources of financing jeopardizes the management of macroeconomic policy. Finally, the issue of volatility is especially important in economies with a relatively low degree of financial development that restricts the ability to face volatility by substituting among different types of flows. Our analysis, therefore, becomes even more poignant.

Traditionally, capital flows' volatility has been considered as inherent to short-term capital flows and bank loans. In this sense, both FDI and ODA flows have generally been considered as "sticky" flows that tend to be allocated to the recipient economy with a long-term commitment. FDI especially is viewed as a relatively stable type of capital flow and resilient to financial crises.

However, the large amount of academic resources devoted to the analysis of FDI has unveiled unexpected results in terms of its volatility (Claessens et al, 1995; Gabriele et al, 2000; and Haussmann and Fernandez-Arias, 2001). From the theoretical point of view, ODA is expected to be volatile in nature since it depends on the business cycle of the donor, economic changes in potential recipients, lack of coordination between donors, shifts in donor policies, etc. As Bulíř and Hamann (2008) point out, the analysis of ODA volatility is also fairly recent but is increasingly attracting academic attention. The surveys that have focused on the analysis of the volatility of capital flows have compared among different types of capital flows and have paid attention to the different effect on the recipient economies. Despite the attention paid to the volatility analysis, we have not come across any study that compares the volatility of FDI and ODA flows for any specific recipient countries.

In this section, we conduct a volatility analysis for both types of flows for Argentina and Brazil. Our first approach to the analysis of volatility is through the analysis of the variation coefficient

of FDI and ODA flows. We use time series in constant dollars (2000) and smoothed series filtered by Hodrick-Prescott method. Table III shows the main results that are the following:

- GDP in Argentina was more stable than in Brazil;
- FDI is the most volatile flow in both countries; and a bit more volatile in ARG (CV=1,29) than in BRA (CV=1,14)
- ODA is less volatile than FDI but more than GDP in both countries. ODA in ARG (CV=0,59) is more stable than in BRA (CV=0,70).

When time series are de-trended by Hodrick-Prescott filter, the results do not vary.

[Insert Table III about here]

The results are significantly lower than the one found by Front and Santiso (2008) for the period 1960 to 2006 for all the developing countries. To reduce the potential effect of the increasing trend in flows, we split up the sample by decades and we obtain the results displayed in Table IV.

[Insert Table IV here]

The highest volatility in both countries is displayed by FDI but whilst in Argentina the highest period happened during the '80s in Brazil was in the '90s. The most volatile period of ODA in Argentina was also in the '80s but it was the '70s in the case of Brazil. In Argentina, the most stable period has been for 2000-2006 both in FDI and ODA. On the contrary, In Brazil, ODA's most stable period was during the '90s whereas FDI was rather volatile.

In order to improve the volatility analysis, we have borrowed from Bulíř and Hamann (2008). We first work with gross ODA in nominal and real terms and obtain the deflators. We apply these deflators to the FDI series so we can work with both series in $ 2006. We then take the natural logarithm to limit the different scales problems. Next, we proceed to normalized the series by first dividing by the average and multiplying by a 100 as to enable the comparison of the variations (as Hudson & Mosley 2008). In this way, the mean for the whole period an series

are 100. We then run the Hodrick-Prescott filter to each series (using lambda 100 and lambda 7) both normalized and non-normalized. The results are displayed in Table V.

[Insert Table V here]

The results confirm what we had already discovered; FDI is, for both countries, more volatile than ODA. Also partially confirming our previous results, ODA flows to Argentina are more volatile than their counterparts to Brazil. Furthermore, in Argentina the volatility of ODA flows increases with time. This is somewhat surprising since, according to the results showed in Section IV.I, ODA flows are relatively concentrated by donors in Argentina and certainly more than in Brazil. While ODA flows to Brazil are relatively stable, those to Argentina peak in 1995 ($293 millions) and continuously decrease until the year 2000 when they reached $176 millions. However, the sharp financial crisis that Argentina experienced at the end of 2001 encouraged strong ODA inflows that led to levels similar to those received at the beginning of the 1990s.

Regarding FDI, flows to Argentina have also been more volatile, with the exception of the period 1988-1998 when Brazil shows the highest FDI volatility. This higher volatility in Argentina could be explained by the fact that the country has traditionally experienced a sharp volatility on the real side of the economy. The higher volatility of FDI vis-à-vis ODA seem to indicate that international organizations should be cautious when issuing policy recommendations that suggest that FDI could be used to replace ODA in certain developing and emerging countries. The results also pose the opposite question; Do ODA flows cover the gap left by FDI outflows or "sudden stops"? We seek to find an answer in the next section.

4.3. Relationship between ODA and FDI shocks

As we have mentioned in the previous section, the volatility of capital flows, and especially that of private capital flows, is a threat for developing and emerging economies and it increases the

probability of financial crises. In this sense, ODA flows could potentially act as a buffer, increasing when private capital flows decrease.

In this section, we borrow from Frot and Santiso (2008) and Arellano *et al*. (2009) to analyze the relationship between ODA and FDI shocks. The goal is to assess whether donor countries take into account the variability of FDI flows when deciding how and where to allocate ODA, i.e., we analyze whether ODA is pro-cyclical or counter-cyclical regarding private foreign direct investment flows. In order to do so, we calculate the correlation between aid and FDI shocks, that we compute by obtaining the gap between the variable and its five year moving average. The results are displayed in Chart III.

[Insert Chart III here]

Our statistical analysis suggests that the only statistically significant relation is that between FDI and ODA shocks levels in Brazil. These results could indicate that countries that have allocated official aid flows to Brazil do take into account the variability of private capital flows when deciding their ODA priorities. Therefore, official aid flows seem to compensate for negative FDI shocks.

5. FINAL REMARKS

Our analysis has sought to determine the empirical relationship, if any, between the FDI and ODA flows allocated to two middle-income countries; Argentina and Brazil. While ODA flows to both countries do not play a crucial role as a source of financing and are below the average of the Latin American region, its relationship to FDI could unveil important results.

The investors-donors matrix that we have elaborated shows that there is a relative coincidence between investors and donors for both economies. This coincidence is higher for Argentina that

also displays a higher concentration of donors. A simple correlation analysis indicates that this coincidence does not signal a cause-effect relationship and that, therefore, we cannot identify neither complementarities nor substitution between the two types of flows. The only exception where we find symptoms of flow co-movement is in the specific case of German and Japanese FDI and ODA flows allocated to Brazil.

While scarce data does not enable us to break down FDI by sectors in Brazil for the period under analysis, the sectorial analysis for ODA is possible and provides interesting results that complement the correlation exercise. To be sure, once we break up German and Japanese ODA flows by sectors, the correlation between German FDI and ODA allocated to the infrastructure sector is low. However, the coefficient for Japan is significant and could indicate the presence of the so-called "vanguard effect". Moreover, the fact that both flows present opposite trends could be interpreted as if ODA flows "opened the door" to foreign investment.

Given the impact of volatile capital flows in middle-income economies, we have performed a two-step volatility analysis. The first step that relies on the calculation of the variation coefficient shows that, as expected, FDI is more volatile than ODA. Despite the higher donor concentration, ODA flows are more volatile in Argentina than in Brazil. FDI flows are also more volatile in Argentina, probably signaling the higher instability of the real side of the economy. The second step in our volatility analysis is more sophisticated but confirms the previous results.

We complete our empirical analysis with an examination of the relationship between FDI and ODA shocks. Our goal is to discern whether official aid has helped protect both countries from FDI shocks. Borrowing from Frot and Santiso (2008), our results show that ODA flows to Brazil do in fact relatively compensate for FDI outflows during the period under analysis. This contradicts Frot and Santiso's results who do not find any significant correlation between ODA and private capital flows shocks.

To sum up, our study does not point to any coordinated action between private and public economic agents in the allocation of ODA and FDI flows. The only exception is Japanese flows to Brazil that signal towards a "vanguard effect". Curiously enough, this effect has already been advanced by Kimura and Todo (2007) in their analysis that focuses on Japan. Our volatility analysis suggests that international organizations should be cautious when recommending that FDI could replace ODA as a financing source.

There are many possible extensions to our analysis. We particularly focus on the following:

(a) Improve the correlation analysis by breaking up the FDI series by sectors. This type of survey is currently limited by the scarcity of data for Brazil.

(b) Improve the volatility and capital flows shocks analysis by taking into account whether there are sudden stops. The goal would be to ascertain whether ODA flows could act as protection against sudden stops (generally defined as a reversal in financial flows of more than 5% of GDP compared to the year before)

(c) Carry out a persistence analysis of both flows through the calculation of the autocorrelation coefficients.

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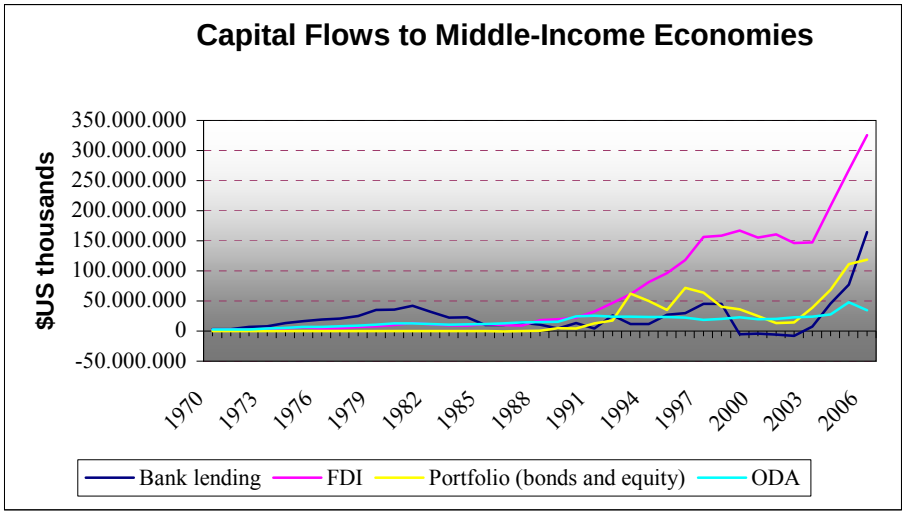
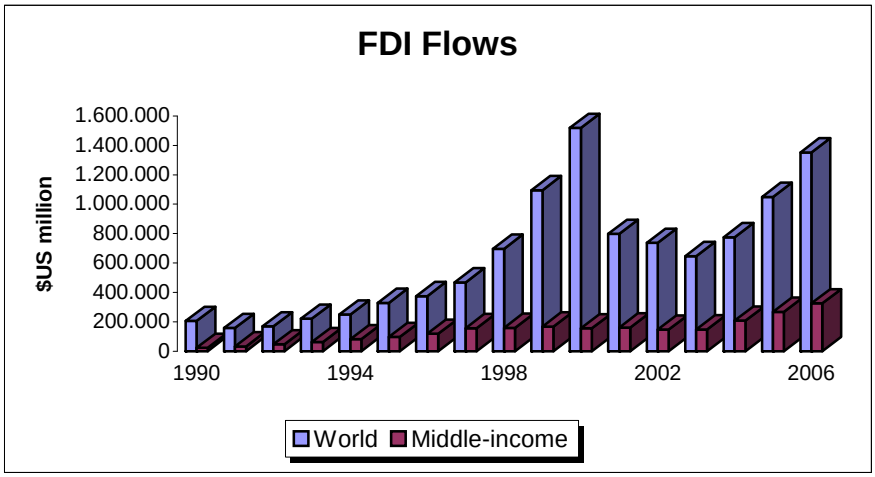
CHARTS AND TABLES

Chart I



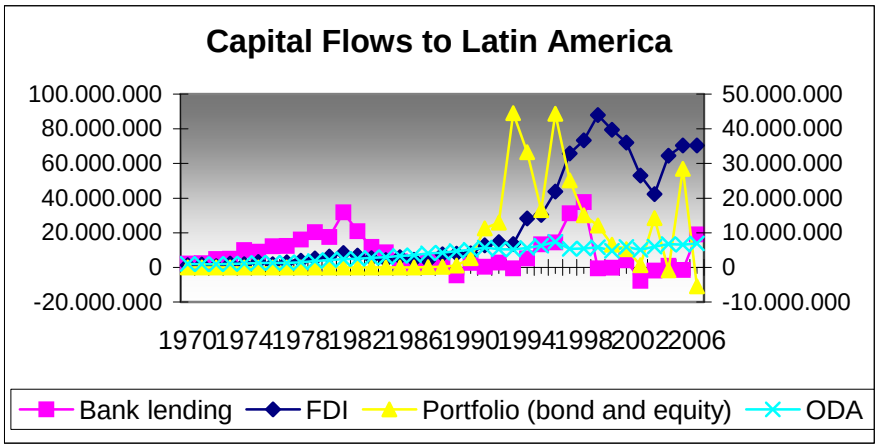
Source: WDI 2008. Data on portfolio flows has been calculated adding up bonds and equity for the period 1989-2006. For the period 1970-1989, portfolio data only inlcudes equity.

Chart II



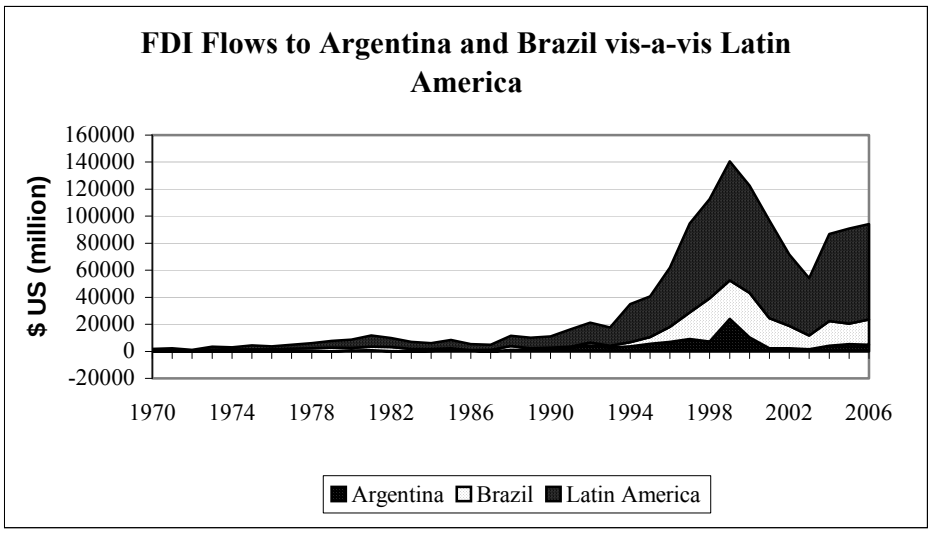
Source: WDI 2008. Flows to middle-income economies have been calculated adding up flows to lower middle-income and upper middle-income countries.

Chart III



Source: WDI 2008. Data on portfolio flows has been calculated adding up bonds and equity for the period 1989-2006. For the period 1970-1989, portfolio data only inlcudes equity.

Chart IV

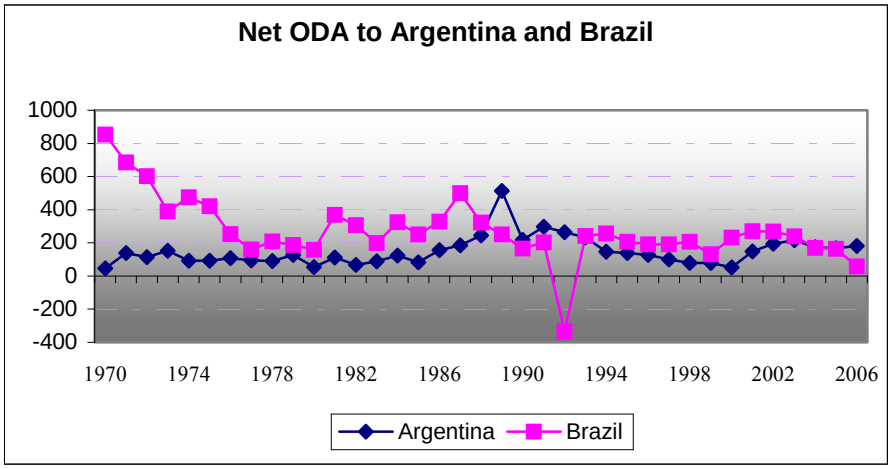


Source: WDI 2008

Data for Chart I

	LAC	Argentina	Brazil
1970	1,598.6	89.8	391.7
1971	1,941.2	125.7	449.0
1972	987.7	71.7	459.9
1973	2,623.0	100.3	1,180.7
1974	2,224.3	17.9	1,207.9
1975	3,514.3	55.6	1,202.8
1976	3,139.4	244.7	1,391.1
1977	3,131.8	144.0	1,827.2
1978	4,222.4	250.0	2,180.3
1979	4,801.8	206.0	2,407.8
1980	6,415.8	678.0	1,910.2
1981	8,624.2	837.0	2,521.9
1982	7,025.9	227.0	3,115.2
1983	5,174.3	185.0	1,326.1
1984	3,999.3	268.0	1,501.2
1985	6,223.1	919.0	1,418.4
1986	4,639.3	574.0	317.2
1987	5,772.6	-19.0	1,169.1
1988	9,123.3	1,147.0	2,805.0
1989	8,766.7	1,028.0	1,129.9
1990	8,926.1	1,836.0	988.8
1991	11,610.9	2,439.0	1,102.2
1992	16,149.8	4,431.0	2,061.0
1993	15,133.7	2,793.1	1,290.9
1994	29,007.5	3,634.9	2,149.9
1995	29,513.0	5,609.4	4,405.1
1996	46,263.0	6,948.5	10,791.7
1997	73,504.4	9,160.3	18,992.9
1998	85,466.5	7,290.7	28,855.6
1999	104,084.5	23,987.7	28,578.4
2000	98,267.4	10,418.3	32,779.2
2001	80,923.2	2,166.1	22,457.4
2002	57,731.7	2,148.9	16,590.2
2003	45,884.8	1,652.0	10,143.5
2004	94,419.7	4,124.7	18,145.9
2005	76,375.5	5,265.3	15,066.3
2006	92,927.0	5,037.3	18,822.2
2007	126,240.3	5,720.4	34,584.9

Chart V.

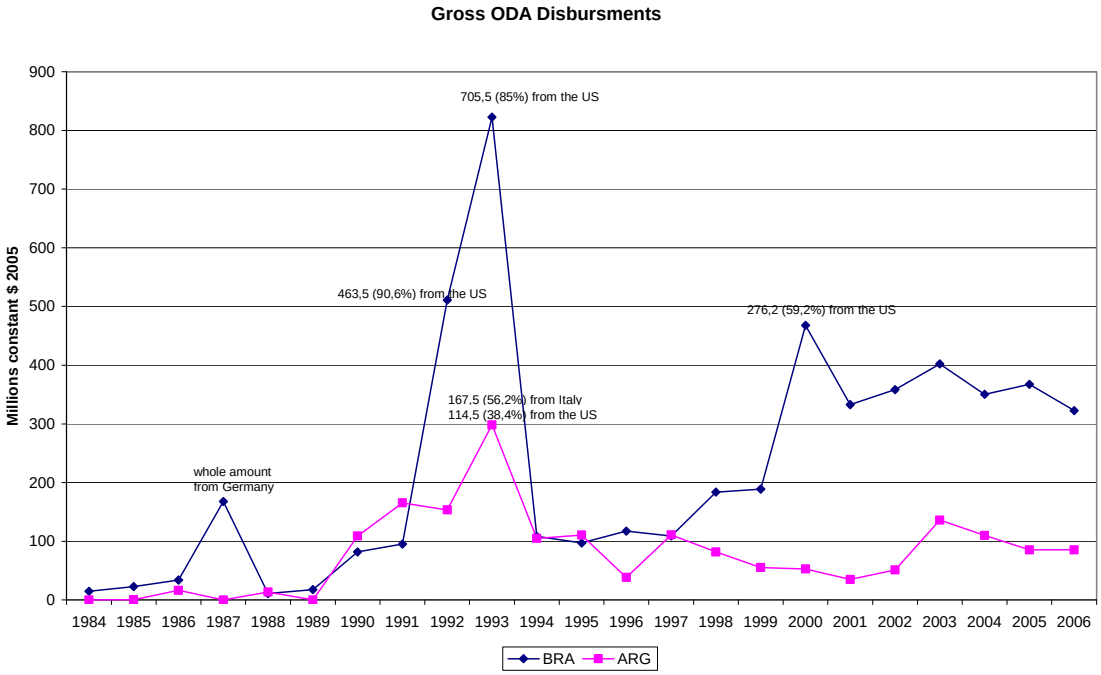


Source: WDI (2008). We have deflated the Net ODA flows series using a GDP deflator calculated with the 2000 constant and current GDP data.

1970	46,89	853,80
1971	139,44	684,56
1972	114,31	602,40
1973	152,11	389,92
1974	91,61	474,30
1975	92,66	420,79
1976	108,11	252,18
1977	95,15	160,92
1978	89,59	208,59
1979	126,40	187,83
1980	53,69	157,12
1981	110,76	368,39
1982	67,07	306,53
1983	89,28	198,69
1984	123,77	324,38
1985	82,33	250,66
1986	155,77	327,40
1987	185,16	500,56
1988	244,02	322,75
1989	513,22	250,17
1990	217,51	164,95
1991	296,15	201,94
1992	265,07	-334,81
1993	232,57	242,05
1994	146,30	257,36
1995	138,26	206,02
1996	126,91	191,77
1997	99,73	191,37
1998	78,53	206,45
1999	78,12	131,13

2000	52,78	232,27
2001	147,60	270,50
2002	194,01	268,05
2003	215,29	238,50
2004	174,37	169,42
2005	167,23	163,44
2006	180,35	58,30

Chart VI. Gross ODA to Argentina and Brazil.



Disbursments, Millions constant $ 2005						
Year	Bilateral	Multilateral	ODAdis_cons_BRA	Bilateral	Multilateral	ODAdis_cons_ARG
1984	14,8128		**14,81**			**0,00**
1985	22,547969		**22,55**	0,168889		**0,17**
1986	33,97888		**33,98**	16,274536		**16,27**
1987	167,521076		**167,52**			**0,00**
1988	10,804111		**10,80**	13,379639		**13,38**
1989	17,526525		**17,53**	0,012819		**0,01**
1990	81,843294		**81,84**	109,062222		**109,06**
1991	95,107628		**95,11**	165,576788		**165,58**
1992	511,136466		**511,14**	153,433556		**153,43**
1993	822,791962		**822,79**	298,139224		**298,14**
1994	108,399817		**108,40**	104,738056		**104,74**
1995	97,068615		**97,07**	110,625328		**110,63**
1996	117,276355		**117,28**	38,396854		**38,40**

1997	108,984873		**108,98**	110,730008		**110,73**
1998	183,651565		**183,65**	81,648769		**81,65**
1999	188,855014		**188,86**	55,351988		**55,35**
2000	466,210746	1,6746	**467,89**	51,632034	1,2112	**52,84**
2001	328,63068	4,1035	**332,73**	32,84303	1,8597	**34,70**
2002	355,515901	2,6857	**358,20**	49,618846	1,4771	**51,10**
2003	398,6527	3,4318	**402,08**	130,47775	5,4839	**135,96**
2004	346,37391	3,902921	**350,28**	103,48034	6,326634	**109,81**
2005	346,124131	21,267707	**367,39**	74,513831	10,6924	**85,21**
2006	310,977362	11,719307	**322,70**	58,614927	26,811095	**85,43**

Table I: BILATERAL ODA (GROSS DISBURSEMENTS in constant USD 2005): SECTORIAL DISTRIBUTION AND MAIN DONORS.

PANEL A. ARGENTINA: 1991-2006

Sector / Donor	Debt	Commodity_Gral. Prog	Emergency	Ec Infraestructure	Social Inf & Services	Multisector	NGOs	Production	Unallocated	Adminis Costs	TOTAL
% bilateral aid	4,6%	5,9%	0,4%	18,5%	25,3%	5,8%	0,3%	21,9%	0,6%	0,4%	83,8%
Million $	81,76	103,93	7,13	325,40	445,24	102,81	4,62	384,61	10,68	6,90	1.473,07
Main donor	*Germany*	*Spain*	*Spain*	*Italy*	*Spain*	*Italy*	*Italy*	*Italy*	*Japan*	*France*	
Million $	71,31	64,01	5,68	310,66	195,09	62,42	2,52	293,62	6,83	6,72	
% sector	87,2%	61,5%	79,6%	95,4%	43,8%	60,7	54,5%	84,2%	63,9%	97,3%	

PANEL B. BRAZIL: 1984-2006

Sector / Donor	Debt	Commodity_Gral. Prog	Emergency	Ec Infraestructure	Social Inf & Services	Multisector	NGOs	Production	Unallocated	Adminis Costs	TOTAL
% bilateral aid	2,5%	0,0%	0,2%	7,4%	26,0%	16,9%	1,7%	11,6%	0,6%	0,7%	67,6%
Million $	127,86	0,25	12,25	382,44	1.336,30	865,47	87,78	594,19	28,25	36,01	3.470,80
Main donor	*Germany*	*Spain*	*Switzerland*	*Germany*	*Japan*	*Japan*	*Netherlands*	*Japan*	*Japan*	*France*	
Million $	67,6	0,15	4,97	171,51	523,66	490,07	57,56	255,97	8,99	17,68	
% sector	52,8%	60,0%	40,5%	44,8%	39,1%	56,6%	65,5%	43,0%	31,8%	49,0%	

Source: DAC-CRS On line and authors' calculations. The period of analysis is function of data availability..

Table II
Main investors and donors in Argentina and Brazil

Ranking Investor/Donor	Argentina 1992-2002	Brazil 1990-2002
1	Spain/Italy	United States/United States
2	United States/United States	Spain/ Japan
3	Italy/ Spain	Netherlands/ Germany

Source: Author's elaboration of data from UNCTAD and CAD

Table III. FDI and ODA Volatilities 1970-2006.

Variation Coefficients

Variable (constant USD 2000)	cv	Filtered Variables	*cv*
GDP-ARG const	0,21	sGDP-ARG	*0,20*
FDI-ARG	1,29	sFDI-ARG	*0,91*
netODA-ARG	0,59	s nODA-ARG	*0,30*
grossODA-ARG	0,41	s gODA-ARG	*0,22*
GDP-BRA	0,31	sGDP-BRA	*0,31*
FDI-BRA	1,14	sFDI-BRA	*0,90*
netODA-BRA	0,70	s nODA-BRA	*0,49*
grossODA-BRA	*0,36*	*s gODA-BRA*	*0,25*

Source: Authors' own calculations

Table IV. FDI and ODA Volatilities by decades. Filtered series.

period	sFDI-ARG	s nODA-ARG	s gODA-ARG	sFDI-BRA	s nODA-BRA	s gODA-BRA
1970-79	0,26	0,02	0,09	0,15	0,35	0,28
1980-89	0,42	0,28	0,23	0,23	0,05	0,04
1990-99	0,34	0,21	0,09	0,59	0,05	0,02
2000-06	0,02	0,09	0,01	0,05	0,10	0,04

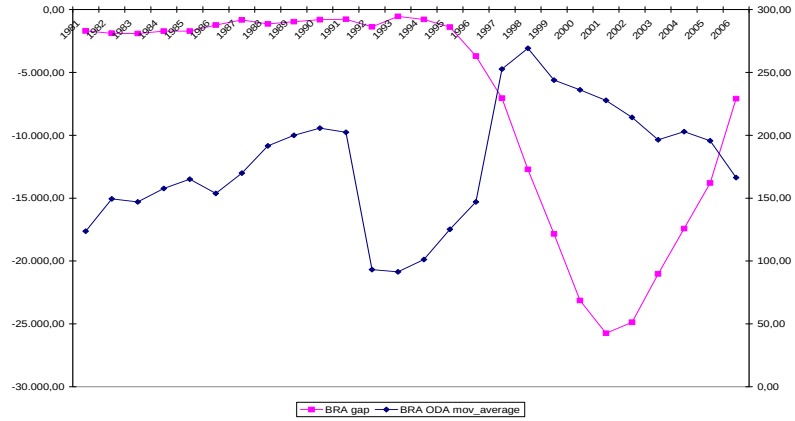
Source: Authors' own calculations

Table V. Volatility Analysis

	NFDI_ARG	NFDI_BRA	NODA_ARG	NODA_BRA
1975-2007				
est.dev.	131,17	104,67	44,50	20,74
Mean	100,00	100,00	100,00	100,00
Median	57,56	49,93	81,25	98,18
Cv	1,31	1,05	0,45	0,21
1975-86				
est.dev.	15,04	15,60	15,71	26,45
Mean	21,07	40,25	66,38	109,52
Median	15,02	39,23	62,12	106,50
Cv	0,71	0,39	0,24	0,24
1988-98				
est.dev.	78,37	100,80	30,94	13,69
Mean	125,90	73,67	150,12	90,84
Median	112,62	22,36	139,07	92,29
Cv	0,62	1,37	0,21	0,15
1998-2007				
est.dev.	191,71	85,20	30,53	13,59
Mean	188,21	230,84	87,62	97,42
Median	122,20	230,64	79,67	99,40
Cv	1,02	0,37	0,35	0,14
1988-2007				
est.dev.	135,70	110,46	51,78	28,34
Mean	152,40	140,03	120,75	93,05
Median	116,13	124,05	125,16	93,67
Cv	0,89	0,79	0,43	0,30

Source: Authors' own calculations

Chart III. FDI-ODA Shocks



Source: Authors' calculations

Data for Chart III

Year	BRA Gap	BRA (moving average)
1981	-0,02	0,058
1982	0,05	0,064
1983	-0,14	0,062
1984	-0,11	0,068
1985	-0,19	0,072
1986	-0,54	0,068
1987	-0,15	0,072
1988	0,29	0,076
1989	-0,19	0,07
1990	-0,16	0,064
1991	-0,13	0,058
1992	0,10	0,024
1993	-0,02	0,02
1994	0,19	0,02
1995	0,17	0,022
1996	0,66	0,02
1997	1,25	0,04
1998	2,07	0,036
1999	2,30	0,03
2000	1,62	0,03
2001	0,06	0,032
2002	-0,94	0,034
2003	-1,99	0,036
2004	-0,66	0,036
2005	-1,01	0,032
2006	-0,51	0,026

Brazil: FDI shocks and ODA shocks Correlation Analysis

	Constant	BRA ODA moving	
Coefficient	12824,1	-113,766	
Std. error	5298	28,74	
t-value	2,42	-3,96	
p-value	0,023	0,001	
R2		0,3949	
Obs		26	[0,001]*
F (1,24)		15,67	
DW		0,37	
Independent var: BRA FDI gap			

Source: Authors' calculation.

[1] According to the guidelines set forth in the Fifth Manual of the Balance of Payments of the International Monetary Fund (IMF, 1993) and the OECD's Benchmark Definition of Foreign Direct Investment (OECD, 1996), FDI is a type of international investment that reflects the intention of an entity resident in a particular country (the foreign investor) to acquire long-term equity in an entity resident in another country (the non-resident company).

[2] From an international financing perspective, it is important to note that both countries are considered emerging economies according to the JP Morgan's EMBI Global Index.

[3] During several years of these periods of high growth, FDI increased faster than global trade and GDP (UNCTAD's WIR, several years).

[4] Data calculated using the UNCTAD FDI Online Database.

[5] It is crucial to point out that FDI geographical data could be affected by the so-called "Netherlands Distortion" or "Netherlands effect." This effect refers to the fact that some FDI is channeled through holding companies in the Netherlands for tax reasons. The databases that we have used for our statistical analysis do not enable us to distinguish whether the home country is the Netherlands or some other home-country through a Dutch holding company.

[6] It is important to point out that Brazil has traditionally suffered from acute income distribution problems while Argentina is an unfortunate example of extremely volatile patterns of economic growth that give rise to periodic rises in poverty.

[7] This data reveals that neither Argentina nor Brazil display a high dependence on ODA financing. The threshold commonly used to classify an economy as dependant on ODA flows is an ODA/GNI of 15%.

[8] The sharp drop in net ODA to Brazil in 1992 is due to the repayment of refundable aid granted by the USA to Brazil.

[9] As we have already mentioned, it is important to remember the impact of the so-called "Netherlands Distortion" or "Netherlands effect." The UNCTAD database does not enable us to distinguish whether the home country is the Netherlands or other home-country through a Dutch holding company.